**West End-North Side Bridge**
(West End Bridge)
Spanning the Ohio River
Pittsburgh vicinity
Allegheny County
Pennsylvania

HAER No. PA-96

HAER
PA,
2-PITBU.V,
3-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
Mid-Atlantic Region
National Park Service
U. S. Department of the Interior
Philadelphia, Pennsylvania 19106

HAER
PA,
2-PITBU.V,
3-

HISTORIC AMERICAN ENGINEERING RECORD

**West End-North Side Bridge**
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HAER No. PA-96

Location: Spanning the Ohio River, approximately 1 mile downstream from the confluence of the Monongahela and Allegheny rivers
Pittsburgh, Allegheny County, Pennsylvania

UTM: 17.4477720.582560
Quad: Pittsburgh West

Date of Construction: 1931-1932; repaired in 1948, 1955, 1958, 1977

Engineer: Allegheny County Bureau of Bridges

Present Owner: Pennsylvania Department of Transportation
Transportation & Safety Building
Harrisburg, Pennsylvania 17120

Present Use: Vehicular bridge

Significance: After two decades of agitation by the local business community, the West End-North Side Bridge was completed in 1932 by the American Bridge Company under contract to Allegheny County. The main span is a graceful, 778-foot long, tied-arch structure which employed pre-stressed hangers between the twin arches and the bottom chords. This bridge was placed on the National Register of Historic Places in 1979 for the engineering and aesthetic qualities of the main span. Approaches to the high level main span are by three pony trusses on the south and four pony trusses on the north.

Project Information: This recordation was conducted for the Federal Highway Administration and the Pennsylvania Department of Transportation in July and August 1985, to fulfill the requirements of the Memorandum of Agreement (MOA). The MOA stipulates that the northern approach spans, the focus of this study, be recorded prior to their demolition and the construction of the West End Bridge-Ohio River Boulevard Interchange. This documentation has been prepared under the direction of

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## I. HISTORY OF THE WEST END-NORTH SIDE BRIDGE

### A. Introduction

On December 1, 1932, amidst news of hunger marches, "share-the-work" campaigns, and exhausted local relief funds, Pittsburgh celebrated the opening of the $3,640,000 West End-North Side Bridge. The opening of the bridge was the culmination of twenty-five years of agitation for a bridge to link the city's industrial North Side with the growing newer communities of the West End and the South Hills (Pittsburgh Post Gazstte, December 2, 1932).

On the evs of the bridge opening, the North Side-West End Bridge Cslebration Committee, representing twenty Allegheny County civic organizations, hosted a gala banquet at the Fort Pitt Hotel that was attended by the county commissioners, Pittsburgh and South Hills businessmen, members of the West End Board of Trade, the South Hills and North Borough Highway Association, and msmbers of the Pittsburgh City Council. The master of ceremonies was Henry Tranter, a prominent Pittsburgh manufacturer, a lifelong resident of Greentree Borough, the former head of the West End Board of Trade, an active member of the Pittsburgh Chamber of Commerce's Bridges and Highways Committee, and the moving force behind the building of the West End-North Sids Bridge. Tranter called the bridge opening "an epoch in the hietory of Pittsburgh and Allegheny County." Confessing ths obvious, that the new bridge saddled the depression-torn county with an untimely tax burden, the incurable booster Tranter said, "in view of the return of prosperity which I believe is now approaching," the debt is bearable (Pittsburgh Press, Dscember 2, 1932; Post Gazette, December 1, 1932; Post Gazette, December 2, 1932).

At the bridge-opening festivities on December 2, 1932, Tranter's seven-year-old granddaughter, Mary Hershberger, cut the ribbon, officially inviting traffic acroes the new West End-North Side Bridge. Next, a cheering convey of three hundred vehicles motorsd across the new bridge and, taking Main Street and Noblsstown Road, toured the boroughs of Crafton, Greentree, Carnegie, Dormont, and Mount Lebanon before the motorcade returned over the Saw Mill Run Boulevard (Pittsburgh Prees, December 2, 1932).

In historical perspective, the West End-North Side Bridge opening had both symbolic and paradoxical significance. Indeed, as Tranter hoped, the bridge did link North Side and South Hills, a marriage symbolically consummated by the route of the motorcade. Contrary to Tranter'e dream, however, the proeperity conjursd up in the hyperbole surrounding the completion of the bridge never materialized. Instead, as this brief history indicatss, a decade of declins for the North Side and Chateau

areas followed the construction of the four elevated pony truss bridges that form the northern approach.

This study focuses first on ths decision to build the West End-North Side Bridge. It looks briefly at the construction of the bridge and then explores more closely the history of the industrialized Chateau area, that is, the Twenty-first Ward, which was the section moet directly affected by the building of the bridge. This study shows that the four pony truss bridges, which constituted the northern approach to the West End-North Side Bridge, sliced through a historically industrialized neighborhood, the Chateau or shorefront district of old Manchester. This neighborhood also had a large residential component and thus illustrates the historic nexus between work and residence that characterized late nineteenth and early twentieth century urban industrialism. Although the bridge disrupted the residential character of the Chateau area in 1930, it is more fair to argue that the bridge oversaw rather than precipitated the eventual decline of the neighborhood (Rimmel 1969; Hershberg 1981:3-35).

B. The Campaign for the Bridge, 1915-1928

The completion of the West End-North Side Bridge in Decembsr 1932 marked ths culmination of a decade-long, county-wide, public works program in the Pittsburgh region that, in the minds of area businessman, secured the economic future of both the city and the region. Pittsburgh was not alone in exhalting public works as a sound economic insurance policy. Pittsburgh joined Philadelphia, New York, Chicago, and other cities in a frenzy of road, tunnel, bridge, and public building construction. In ths 1920s, Philadelphia rushed to complete its Benjamin Franklin Parkway, extended its Broad Street subway, and crowned its public works building program by constructing a new stadium as part of the city's role in hosting the Sesquicentennial. New York City surpassed every other city in the sheer magnitude of public works expenditures. During the 1920s, Parks Commissioner Robert Moses rammed plans for the new parks, roads, and playgrounds through the New York state and municipal bodiee. (Scott 1969; Caro 1974:1-21; Bauman 1969:1-28).

Pittsburgh, however, never lagged far behind in the "race" for public works. Under the banner "Pittsburgh Forward" and shouting "Smoke and Soot Be Damned," Pittsburgh businessmen, civic leaders, and public officials determined to secure the city's position as an industrial giant and to accomplish that objective through public works and the promotion of physical growth. As during the 19th century, Pittsburgh boosters equated prosperity with untrammeled growth, and they identified improved transportation as the key to that growth. Throughout the 1920s, the Pittsburgh Chamber of Commerce pressed the county to float "People's Bond" issues to fund a bevy of transportation projecte, including the

building of the Ohio River Boulevard, the Saw Mill Run boulevard, Allegheny River Boulevard, the Liberty Tunnels, the Liberty Bridge, the McKses Rocke Bridge and, finally, the West End-North Side Bridge (Greater Pittsburgh, October 25, 1926; Pittsburgh Firet, December 6, 1924).

In addition to elaborating a system of boulevarde and beltways to conform Pittsburgh's traffic patterns to the needs of the automobile, local boostere sought to modernize the region's river system. Area businessmen and industrialists promoted a new canal system to connsct the city with Lake Erie ports. Businees leaders also pressed for the deepening of the river channels and for raising the area bridges in order to facilitate ths use of large ships. Indeed, work underway in the 1920s to install nsw locks and deepen the channel in the Ohio River expanded the capacity of the Pittsburgh, Cincinnati, and Louisville river network, so that in 1925 the Ohio Rivsr carried close to 16,000,000 tons of goods (Pittsburgh First, July 10, 1926).

As much as modern roadways, bridges, and river improvements met the nesds of business and industry, in the minds of 1920-style boosters, road and bridge improvements just as importantly served the growing population of motorists. The "good roads and bridges" movement promoted the plans of suburban businessmsn and real estate developers anxious to expand the South Hills and North Hills as residential communities (Pittsburgh First, June 19, 1926; Pittsburgh Firet, October 2, 1926). Pittsburgh's euburban development proceeded at a feverish pace during the mid-1920s. From April 1924 to April 1925, total building construction in Pittsburgh increased by 17 percent and home building accounted for 47 percent of ths new construction. One important locus of the new suburbanization lay in the city's South Hills section -- Mount Washington, Dormont, Bethel Park, Mount Lebanon, and Greentree.

Therefore, it is quite understandable that the cause of the West End-North Sids Bridge would be championsd by a person with businees and sentimental interests in both North Side and South Hille. Called the "Father of the West End-North Side Bridge," Henry Tranter (1865-1940) headed the firm of Tranter Manufacturing, located at 105 Fort Pitt Boulevard. The Tranter manufacturing plant sat on Water Street on North Side and was "one of the best known machine ehops and machine jobbers in the Pitteburgh area," according to Sylvester K. Stevens (Stevens 1969:1940-1949; Polk 1932). The Trantsr firm produced mill, mine, and factory equipment, including pumps, boilers, engines, and hoists. Tranter's principal civil interest lay in the development of modern highway arteriee and bridgss. From 1915 until 1935, he chaired the Pittsburgh Chamber of Commerce's Highwaye and Bridgss Committee. He also served on the Pittsburgh City Transit Commission. Although Tranter's main business concerns were located in the central city and on

North Side and, as an officer of the West End Savings and Trust Company and a director of the Security Savings and Loan of the West End, he had a strong interest in the future of the western section of the city. Moreover, as a lifelong resident of Greentree Borough -- his family had settled in the area in colonial times -- Tranter understandably had a proprietary interest in promoting the growth and development of his ancestral domain (Stevens 1969:1940-1949).

In a 1912 presentation before the West End Board of Trade, Tranter had urged the construction of a bridge crossing, connecting West End and North Side. Since 1880 or earlier, only a ferry service linked the two communities (Post Gazette, December 2, 1932; Hopkins 1890). In the mid-1920s, under the leadership of Tranter And J. G. Shaw, a North Side orator and historian, West End and North Side businessmen joined South Hills merchants and developers in promoting the West End-North Side Bridge (Herbertson 1970).

In 1923, Allegheny County blasted a tunnel through Mount Washington for the Liberty Tunnels and, in 1928, opened a high level bridge "to connect the north entrance of the tunnel directly with one of Pittsburgh's main automobile arteries at the fringe of the downtown section" (Campbell 1926:23). In 1926, the Pittsburgh Chamber of Commerce hailed the tunnel and the proposed Liberty Bridge project for opening up a section of the city "splendidly adapted for homes." Because of the tunnel, "homes and stores are springing up over a large area (of the South Hills)," observed the Chamber of Commerce in 1926, and "eventually . . . the territory will become the best residence section of Pittsburgh" (Campbell 1926:23).

Tranter's fervent belief that a bridge connection would bind the West End, North Side, and South Hills in a marriage of prosperity drove the campaign for the West End-North Side Bridge. After his 1912 speech, Tranter chaired the committee that was formed to urge the bridge's construction. Between 1912 and 1928, Tranter, the Pittsburgh Chamber of Commerce, and the South Hills and North Borough Highway Association tied the West End Bridge project to another proposal for the building of the Saw Mill Run Boulevard. The tempo of agitation for the two projects intensified by the mid-1920s. In 1926, Tranter, who had also pressed for the construction of Banksville Road, the Perry Highway, and the Manchester Bridge, observed that

> North Side . . . has long been developed and is a great factor in the industrial and business affairs of Pittsburgh. The southwest side has been developing by leaps and bounds during late years. For lack of transportation facilities they are widely separated and both work at a great disadvantage by that fact. The West End crossing bridge

> would bring them so closely together that their interest would be practically one (Pittsburgh First, June 19, 1926).

According to Tranter, the West End-North Side Bridge would have a salutary effect on the regional economy and, with the Saw Mill Run Boulevard project, "would do more toward relieving the congested condition of the downtown district of the city than anything else before the people at the present time" (Greater Pittsburgh, October 2, 1926).

During the second half of the 1920s, Allegheny County sustained a vigorous pace of public works construction. Between 1924 and 1927, seven large county bridges were completed, spanning the Allegheny and Monongahela rivers alone (Engineering Society of Western Pennsylvania 1930:13). While studies continued for a bridge crossing at the confluence of the three rivers, the county commissioners kept the public works bandwagon rolling and, in 1928, approved a whopping $43,680,000 "People's Bond Issue" for public works. The package of public works, funded by the bond issue, represented the fulfillment of Tranter's dream (Civic Club Minutes, June 1928). The approved projects included roads, bridges, and public buildings, among them the Saw Mill Run Boulevard, the McKees Rocks Bridge, the Allegheny River Boulevard, the Tenth Street Bridge rebuilding, and the West End-North Side Bridge. In addition, $2,550,000 was earmarked for the erection of a new oounty office building At Diamond and Ross streets, and $1,500,000 was budgeted for the Allegheny County Airport (Allegheny County Controller's Annual Report 1928:286-287). By January 1, 1930, the West End-North Side Bridge became one of 39 county bridges either under construction or awaiting action (Allegheny County Controller's Annual Report, December 31, 1930).

The West End-North Side Bridge project was part of the urban modernization process experienced by cities nationally in the 1920s. Like New York's parkways, Chicago's beltways, and Philadelphia's Benjamin Franklin Parkway, it was part of a concerted effort to impose efficient traffic patterns on the gritty industrial city and to fit the city to function effectively in the automobile age. Clearly, the West End-North Side Bridge was a vital component in the Pittsburgh planner's scheme for an Inter-District Traffic Circuit that involved the Liberty Bridge, the Liberty Tunnels, the Saw Mill Run Boulevard, and Western Avenue on North Side. Undoubtedly, on a less technical level, the bridge fulfilled Tranter's dream of wedding the economies of North Side, West End, and South Hills (Pittsburgh First, June 19, 1926; Foster, 1979; Tarr, 1978).

C. Building the Bridge

Ths Allegheny County Commissioners' decision to build a bridge across such a commercially and strategically important navigabls watsrway in 1928 involved more than just Henry Tranter's exhortations and a set of blueprints prepared in the offices of the County Dspartment of Public Works. Before securing a necessary charter for the bridge from the U. S. House and Senate, replete with the signature of President Herbert Hoovsr, the bridge plans had to first receive approval from the Army Corps of Engineers and the Secretary of War. Other less-esteemed agsncies participated in the bridge approval process as well. For example, the Pennsylvania Water and Power Resources Board gave its assent, as did the county and city planning commissions, the City Art Commission, the Grand Jury, and the Allegheny County Court of Quarter Sessions (White and Von Benewitz 1928).

Therefore, the county commissioners' decision in 1928 to include the West End-North Side Bridge in their "People's Bond Issue" represented only a first step. It was not until Novsmbsr 1928 that County Commissioners Joseph Armstrong, E. V. Babcock, and Charles McGovern adopted a resolution directing the location, construction, and maintenance of the West End-North Side Bridge, "deeming it expedient for the purpose of accommodating public travel." The commissioners approved the bridge cost at $3,540,000 and, on December 9, 1929, the Allegheny Court of Quarter Sessions, having bsen assured that the notice of the bridgs's imminent construction had been duly advsrtised in city newspapsrs, approved the bridge plan and ordered its construction. It was in September 1930 that the Allegheny County Bureau of Bridges, aided by the County Bureau of Architscturs, accepted the bridge design (Allegheny County Controller's Annual Report, December 31, 1930; Alleghsny County Bridge Docket, November 8, 1929; December 9, 1929; December 20, 1929).

Described as a "tied-arch" bridge, the West End-North Side span was designed by the Allegheny County Department of Public Works, Bureau of Bridges. Historically and technically, ths bridge was the second long-span tied-arch bridge to be constructed in America. The first was the Tacony-Palmyra Bridge that spans the Delaware River in eastern Pennsylvania. Ths West End-North Side Bridge design features pre-stressed wire-rope hangers, a principle which disguisss the massive weight of the bridge. Like the "string of a bow," the hangers put the stress of the bottom chord in tension with the main arch. It was also the first bridge to employ high strength silicon steel (U. S. Department of Interior, 1967).

Since this study focuses on the bridge's impact on the Chateau area on North Side, another aspect of the bridge's dssign warrants greater attention. In order to articulate traffic patterns efficiently between North Side and the Saw Mill Run Boulevard and ths Lincoln Highway on West End, the bridge design raised Main and Steuben streets on West End to the uppsr bridge level, tying the bridge on grade to Carson Street. Connecting the high level bridge to ths high grades on the southern and northsrn ends necessitatsd high level approaches. Therefore, on the southern end, three Warren half-through (pony) truss bridges approach the bridge from Careon Street. Connecting the high level bridge to the high gradss on the southern and northern ends necessitated high lsvel approachee. Therefore, on the southsrn end, three Warren half-through (pony) truss bridges approach the bridge from Carson Street. On the northern side, four Warren (pony) truss bridges approach the bridge from Western Avenue (Allegheny County Controller's Annual Report, December 31, 1939:252). While the truss bridge approach on the southern end crossed only the railroad tracks of the Pittsburgh and Laks Erie Railroad, on ths northern side, the bridge approach cut through eetablished industrial and residential property. Its route included the land adjoining Crucible Steel Company and land occupied by Rodgers Sand Company and the Stroh Steel Hardening Process (Allsgheny County Department of Public Works, Bureau of Bridges, November 1929).

The July 17, 1984, "Final Environmental Impact Statement" (U.S. DOT) found that removal of the pony trusses would not affect the National Register of Historic Places qualities of the West End-North Side Bridge. However, it is clear that the relationship of the bridge to the history of improving the efficiency of Pittsburgh's traffic articulation, especially the engineering of street grades to conform with the bridge height, made the truss bridge approaches an integral part of the design. Viewed from a distAnce, the two Warren truss bridge approaches to the tied-arch main span create a somswhat eymmetrical balance (U.S. DOT 1984:118).

On February 6, 1930, the county awarded the contract for the bridge construction of the giant stone substructure to the Foundation Company of New York. Eight months later, the county gave the contract for the superstructure to the American Bridge Company. While portions of the southern approach opensd in advance of the bridgs completion, the entire project opened officially with a ribbon-cutting ceremony on December 2, 1932, a full five months before the contracted date of completion (Allegheny County Controller's Annual Report, Dscember 31, 1932; U. S. DOT 1984:118-125).

## EPILOG

The building of the West End-North Side Bridge coincided with the crash of the New York Stock Market and the plunge of the American economy into the Great Depression. Instead of consolidating the economies of North Side, West End, and South Hills in a marriage of prosperity, as Henry Tranter believed it would, the bridge loomed over a region gripped by high unemployment and industrial inactivity. The Great Depression weakened the nineteenth century manufacturing economy of the Chateau area. Following World War II, the effects of both the restrictive immigration legislation of the 1920e and the social legislation of the New Deal reshaped the demographic and ethnic composition of the area. The Immigration Reatriction Acts of 1924 and 1927 slowed the movement of new immigrants into the area's working-class neighborhoods. The Wagner Labor Relations Act of 1935, the Federal Housing Administration Act of 1934 and the post-World War II veterans' mortgage program spurred the migration of second generation Polish, Italian, and Lithuanian-Americans to the "cool, green-rim" of euburbia. What these mobile white ethnics left behind in Manchester and Chateau area was the aging induetrial plant and often ramshackle housing. These are the urban characterietice that University of Chicago sociologist Ernest Burgess labeled the "zone of emergency" (Goldfield and Brownell, 1979; Park and Burgess, 1967).

Considering the trauma of the Great Depression, and the significant social, economic, and physical changes transforming urban America after World War II, it is difficult to determine what particular effect the building of the West End-North Side Bridge had upon the Chateau area. By 1960, Manchester's Chateau area had mouldered in the shadow of the four elevated pony truss bridges for nearly three decades. Not only had industry in the area languished or migrated to the suburban fringe of the city, but the population composition had also changed. Dieplacement of the city's black population, as a result of the lower Hill District renewal in the mid-1950s, forced many black families to migrate to the available low rent, graying housing of Manchester. The social and racial composition of the Chateau area had changed considerably by 1960 when blacks comprised 32 percent of the population. At the same time, only 22 percent of the Chateau area population was of "foreign stock," compared with 57 percent in 1930. It was also an area of poverty. In 1960, almost 40 percent of the work force earned less than $4,000 a year (Bureau of the Census, 1960).

In 1961, the Pittsburgh Urban Redevelopment Authority (URA) spotlighted Manchester for a comprehensive elum clearance and redevelopment project. The URA slated the Chateau area as the site for massive clearance and the development of an industrial park to house light induetry. Although most of the old alley housing and two-etory worker homes were demolished in the wave of redevelopment, by 1985 little had been built to replace the cleared structures. Most of the development activity taking place in the shAdow of the West End-North Side Bridge had been undertaken by the developer, Tom Mistick and Sons. The Misticks' Allegheny Millworka occupies both sides of

Belmont Street. Their offices occupy a historically preeerved mill building on Western Avenue, and evidence of their handiwork can be seen in the preservation of the Rodgers Sand warehouse on Ridge Avenue. Indeed, it might be argued that the Misticks are perpetuating a tradition of building and supply first begun when Rodgers Sand bought the Benson Pump site in 1903 and turned it into a builders' supply emporium.

In 1985, the work of Tom Mistick and Sons, the Manchester Community Center, the Pitteburgh History and Landmarks Foundation, and other neighborhood organizations promiees to give the Manchester district and the Chateau area a second chance for glory. The four pony truee bridges that saw the area's demise will be replaced by new bridge approaches and ramps that will connect North Side, Weet End, and South Hills more effectively than the present etructure. Perhaps, then, Henry Tranter's dream of 60 yeare ago will be fulfilled.

## PART II. ARCHITECTURAL AND STRUCTURAL INFORMATION

The northern approach spans of the West End-North Side Bridge carry L.R. 76, Spur 1, from Route 51 on the eouth to the Ohio River Boulevard on the north. The bridge crosses the Ohio River approximately one mile below the "Point," the confluence of the Monongahela and Allegheny rivers. The four northern approach spans are Warren half-through or pony trusses and were conetructed in 1941-1932.

Examination of the original design drawings and field inspection of the four northern pony trues bridgee reveal that they are virtually identical except in length and in the number of panels. Span 8, neareet Western Avenue, and span 5, nearest the maeonry pier (spans 6 and 7) measures 152.75 feet in length. Table 1 presents the major measurements of the different truseee components. The northernmost pony truss (span 8) is typical of the four and has been selected for detailed description and photographic documentation. An extensive seriee of the original deeign drawings has been photographically reproduced (8x10-inch format) for the HAER recordation package and xerographically reproduced for the bound report. A second series of 4x5-inch negativee and contact photographs of membere and components of span 8 is included in the HAER documentation; xerographic copies are included in the bound report.

### A. Physical Description

The truse members, buckle plates, floor beame, roadway and sidewalk stringers, and the bents are made of etructural carbon steel. The deck, sidewalk, abutment, foundations, and river pier are made of concrete. The river pier (pier 5) ie encased in black granite. The clear roadway width is 40 feet between the curbs, which consist of steel bent plates. The clear eidewalk

width is 6 feet 2 inches, and the vertical clearance has no restriction except for the signs about 15 feet above the outside southbound lane. The minimum vertical clearance under span 8 between Reedsdale Street and the bottom of the bridge is 16 feet 1 inch. A 20-inch diameter gas line is suspended from the upstream sidewalk support brackets by means of U-shaped bolts. Four 2-inch Bell Telephone conduits run through an angle-framed window through the floor beAms between the second and third stringers from the upstream (east) end. The telephone conduit is supported between the floor beams by steel hangers. Six 4-inch Duquesne Light Company electric ducts once passed through the floor beam at an angle-framed window between the sixth and seventh stringers from the east side. Near the expansion dams, both the telephone and electric companies have platforms adjacent to their respective lines. The platforms are attached to the stringers and accessed through manholes in the deck.

Spans 5 and 8 are identical, as are spans 6 and 7. The major difference between the two types of spans in the length of the panels. The eight panel points in spans 5 and 8 are spaced 21 feet 4-1/2 inches apart, for a total span length of 171 feet. The panels in spans 6 and 7 are 19 feet 1-1/8 inch each, for a total length of 152 feet 9 inches. The bottom chords of the trusses consist of two web plates and four flange angles with top and bottom lacing bars. Chords L2-L3, L3-L4, L4-L3', and L3'-L2' also have side plates Attached to the web plates. The top chords are composed of two web plates, four angles, bottom lacing, and a top cover plate.

As in the bottom chord, members from panels 2 to 2' bave larger cross sections accommodated by the use of side plates attached to the webs. Vertical posts consist of one web plate and four flange angles arranged in a manner that is similar to an I-beam. Diagonal members U1-L2, L2-U3, U3'-L2 and L2-U1' consist of a web plate, four small flange angles, and two large channels acting as flanges also arranged in an I-beam pattern. Diagonal members U3-L4' and L4-U3' consist of one web plate and four angles that form the flanges.

The floor beams consist of a 69x3/8-inch web, four 6x6x9/6-inch angles, and two cover plates (18x1/2-inch top and 14x9/6-inch bottom), acting as the top and bottom flanges. Each bay consists of eight stringers. Exterior stringers 1, 2, 7, and 8 are CB21x55s and the interior stringers 3, 4, 5, and 6 are CB24x70s. All stringers are seated on two 6x6x9/16-inch angles and are connected at their web to the floor beam web by two 4x3x3/8-inch angles. There are 3/8-inch buckle plates between each pair of stringers in each bay. The buckle plates are 6x6-foot pan-shaped plates; the deepest part is at the center which has a weep hole. The sidewalk stringers are composed of a 20x3/8-inch web plate, two 3-1/2x3-3/8-inch bottom flange angles and two 4x3x3/;8-inch top flange angles. The stringer is supported by a triangular truss consisting of two 3x3x3/8-inch angles, two 3-1/2x3x3/8-inch angles and two 3/8-inch connecting plates.

The concrete deck is 5 inches thick on the sidewalk and varies from 5-7/8-inch thick at the edge of the roadway to 8-3/8-inch thick at the center of the roadway. These dimensions do not include the depression at the center of the buckle plates which is about 2-1/2-inches.

Steel bents 7 and 8 are trusses that are anchored into concrete foundations. Each truss member consists of four angles, two back-to-back and connected to the other two by two 3/4x1/2-inch lacing bars or 21x9/16-inch stay plates. Each bent is 44 feet wide. Bent 7 is about 22 feet high, while bent 8 is 19 feet high. Steel bent 6 consists of two 10-feet deep trueses which support two 6-feet deep girders. The bottom of the truss is about 16 feet above the roadway surface. This permits traffic access to several of the businesses under the bridge. The girders are composed of a 72x1-inch web, four 8x8x5/8-inch angles, and 18-inch cover plates along the top and bottom flange. The trusees consist of four 4x3x3/8-inch angles connected by a web of 2-3/4x3/8-inch lacing bars and 12x3/8-inch stay plates. All thrse steel bent vertical members consist of two boxed members connected by a 45x3/4-inch plate and four 4x4x3/8-inch angles. Each box consists of 20x5/8-inch plates on three sides and 2-3/4x3/8-inch lacing bars on the outsr side. The plates are connected by four 6x4x5/8-inch anglee.

Pier 5 is a large masonry pier that sits on the bank of the Ohio River. The pier ie encased in large black granite blocks that not only give it an aesthetic quality, but endure river action and weather well. The north abutment consiste of concrete retaining walls, including a back wall, the bearing wall, and the side walls.

Rocker bearings are at bents 6 and 8. Each 27x13-inch rocker has a radius of 1 feet 8 inches from the centerline of the 6-inch diameter pine to the 1-1/2-inch thick iron bearing plate, all of which sit on a 27x27x3-inch steel plate. The fixed bearings are at the northsrn abutment and at piers 5 and 7. Each fixed shoe sites on a 3 foot 4 inch by 2 foot 10 inch base. The bearing ie 2 feet high from ths centerline of the 6-inch diameter pin to the base.

B. Structural Information

Although fifty-five years old, the main structural components of the northern trusses are still in good physical condition. The tied-arch bridge (main river span) is currently posted to restrict trucks from using the outside lanes of the bridge. The outside stringer supports under the northern span truesee appsar to be in better condition than those of the main span and southern approach spane. The probable reason for the better condition of the stringer supports in the northern approach trusses is the better condition of the expansion dams, specifically, the copper water troughs, in this section. The deteriorated troughs of the main span and southern epans have allowed the intrueion of corrosive deicing salts.

Through the years, sevsral repairs have been performed on the entire bridge. In 1948, bridge improvements included a bituminous overlay for the deck, a raised median, repairs to the expansion dams and drainage systems, and repair of the concrete on ths abutments and stairs. In 1955, a new concrete deck, reinforced with wire mesh and a raised median barrier, were placed on the sxisting buckle plates. In 1958, the structure was painted. In April 1977, during an indepth inspection, temporary stringer repairs were made at 63 locations. The bridge was painted again in 1980.

The bridge deck and sidewalk deck are in bad condition. Severely delaminated and spalled concrete areas are present throughout the bridge. There are several holes in the concrete deck along the roadway gutter line and inside curb of ths sidewalk.

The only significant problem with the structure is the section loss of the vertical and diagonal truss members at the intersection of the concrete sidewalk. Span 8 has the most deterioration. All members at the top of the sidewalk deck show 10 percent to 25 percent loss in cross-section. Member U1-L1, span 8, west truss; msmber U1-L1, span 8, east truss, and members U1-L1, spans 6 and 7, west trusses, show 50 percent section loss in their respective webs. Msmbers U1-L1 in spans 5 and 6, east trusses, have 50 percent loss in web. Members U3-L3 and U4-L4, span 5, east truss, have 40 percent loss in web. Member U4-L4, span 6, east truss, members L3'-U3', spans 6 and 7, east trusses, and members U1-L1, spans 5 and 6, east trusses, all have 50 percent loss in web. Member U1'-L0', span 5, east truss, has 30 percent loss of web section and three rivets with badly deteriorated heads. Most truss members at the intersection of the bottom side of the sidewalk slab show 10 percent to 25 percent section loss.

The west truss of span 8 has four separate areas where flanges were bent due to collision by vehiclss. Other areas where members were bent by vehicles are span 8, east truss, U1'-L0', and span 7, west truss, members U2'-L2' and U1'-L0'.

The floor beams and stringers are in fairly good condition. There are about 15 pitted and scaled rivet heads on the bottom flangs of about ten floor beams (some exhibit 30 percent loss in the head). The north floor beam over bent 7 at stringers 2 and 3 has 30 rivets with 50 percent head loss each. The floor beam beneath stringsr 6 has 20 psrcent web loss in a one square-foot arsa. There are about ten rivets on the east end and the west end of the bottom flanges of both floor bsams that exhibit 50 percent section loss. At bent 8, there are temporary supports under the outer two stringers (stringers 1 and 8) in each floor beam. The first stringer between both floor bsams is paper thin and full of holes. The span 7 end floor beam web has 25 percent loss in a one-foot square area underneath stringer 1. The floor beam from span 7 over bent 8 has 10 percent web loss under stringer 7 and a 50 percent loss under stringer 8, both about one square foot in area.

Bent 7 hae four lacing bars on the top chord that have lost a quarter of their sections. Bent 8 has about 20 rivets on the top chord that show approximately 30 percent head loss. Also in the top chord intereection, the stay plate is heavily ecaled; the lacing bars have 25 percent loss of area at this juncture. The river pier (pier 5) is in good condition. There are two hair-line cracks in the granite on each face of the pier that run three-quartere of the way up from the river and the railroad. The concrete northern abutment is heavily spalled in the upper west corner of the bearing wall and efflorescent stains are evident. A quarter-inch crack and a 1/8-inch crack run vertically along the face of the bearing wall. A 4x2-foot area is heavily spalled along the joint between the back wall and the bearing wall on the west side of the abutment. The 1969 indepth inepection report showed that the northern abutment had rotated about its base 2 to 2-1/2 inches towArd the river (southward). No additional movement of the abutment has been noted. Span 8 is fixed at the northern abutment, so the movement of the abutment was abeorbed by the sxpansion dame and rockers at piers 5 and 8, and by the longitudinal deflection of pier 7, which ie fixed. The shoes appear to be in good condition; however, expansion shoes at bents 6 and 8 are overly inclined to the south due to the inclination of the northern abutment.

All visible bearings and anchor bolts at the foundations are in good condition, except at pier 8 where two anchor bolts are scaled and have lost about 5 percent of their cross-sectione.

PART III. PROJECT CREDITS

The U. S. Department of Transportation, Federal Highway Administration (FHWA), and the Pennsylvania Department of Transportation (PennDOT) have undertaken to complete the 4000-foot missing link in the Ohio River Boulevard (L.R. 1039, Section 4) and to provide a full interchange with the West End-North Side Bridge. In order to do this, the single northern approach to the Weet End-North Side Bridge. consisting of four Warren half-through or pony trusses, is being replaced by three elevated approaches. A final Environmental Impact Statement and a final Section 4(f) evaluation have been approved. A Memorandum of Agreement (MOA) has been entered into by FHWA, PennDOT, the Pennsylvania State Historic Preservation Office, and the Advisory Council on Hietoric Preservation, etipulating measures to protect the Manchester Historic District. The MOA also stipulates that a HAER recording of the northern approach spane of the West End-North Side Bridge be made prior to their demolition. This recording has been conducted by GAI Consultants, Inc., under the overall direction of Dr. William P. McHugh. Robert J. Houston served as project manager. John S. Prizner, P.E., served as engineering manager, and Dennis M. West served as senior engineer. Dr. John Bauman conducted the historical research. Dan Shaw, Sr., and Dan Shaw, Jr., photographsd the pony trussee on August 7, 1985, and printed the 4x5-inch photographs. Original design drawings were photographed in the 8x10-inch format by The Darkroom, Pittsburgh, Pennsylvania. The drafted figures were prepared by Mr. Frank Policicchio and

Mr. Gregory S. Jones. Photostatic copying of the design drawings and photographs and report reproduction was completed by Messrs. James H. Wylie and Gregory J. Jones. Word processing was conducted under the supervision of Ms. Norma J. Knopp.

PART IV. SOURCES OF INFORMATION

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